

SERVICE DATA
FILE NO. 010-169

Toshiba

TOSHIBA

TELEVISION



MODEL 12SE
MODEL 12SS

TOSHIBA ELECTRIC CO., LTD.

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SPECIFICATIONS

ANTENNA INPUT IMPEDANCE	300 ohm balanced
FOCUS	Electrostatic
INTERMEDIATE FREQUENCIES	
Picture IF Carrier Frequency	38.9 MHz
Sound IF Carrier Frequency	33.4 MHz
PICTURE SIZE	Approx. 75 sq. inch on a 310DMB4
POWER INPUT RATING	25 watts, 220 volts, AC, 50 Hz
	12 watts, 12 volts, DC
TELEVISION RF FREQUENCY RANGE	
Any of 11 VHF channels	47-70 MHz (Channels 2-4)
	173-230 MHz (Channels 5-12)
Any of 48 UHF channels	460-853 MHz (Channels 21-68)

1 INSTALLATION AND SERVICE ADJUSTMENTS

IMPORTANT NOTICE FOR SERVICE PERSONNEL BEFORE SERVICING

READ THE FOLLOWING NOTES BEFORE ATTEMPTING TO TEST OR SERVICE THIS RECEIVER.

SINCE THIS IS A TRANSISTORIZED SET, CARE MUST BE TAKEN TO PREVENT THE TRANSISTORS FROM OVERLOADING WHICH WILL CAUSE PREMATURE FAILURE.

1. The DC voltage at Q901 emitter is 12.0 ± 0.3 volts, when AC 220 volts is supplied to the set.
2. When servicing, watch AC power line voltage so that it does not exceed 240 volts.
3. When making adjustment of deflection circuit including horizontal frequency adjustment described on page 2 of this sheet, AC line voltage must be kept at 220 volts.
4. When varying horizontal frequency, do not deviate more than 200 hertz from the rated center frequency 15.625 KHz.
5. Do not discharge, arc or meter second anode lead of the picture tube and high voltage circuit for protection of transistors within the set. Disconnect the lead and discharge the anode only and not the lead, if required.
6. While the receiver is in operation, do not attempt to disconnect the lead wires.
7. When replacing the parts in the receiver, make sure the power supply cord is disconnected first.
8. When the power is on, do not attempt to short any portion of the circuits at all. This shorting may cause damage to the transistors within the set.

FOCUS

Focus lead (Orange) from Pin 7 of the picture tube socket is soldered to Pin 6 (100V) of the same socket at factory.

If Focus adjustment is required, unsolder the lead from Pin 6 (100V) and solder it to Pin 4 of the socket. (Ground)

DEFLECTION YOKE AND CENTERING RINGS

1. Turn the receiver on and connect the antenna.
2. Loosen the Deflection Yoke clamp, and carefully move the yoke on the neck of the picture tube as far forward as possible.
3. Rotate the yoke until the top and bottom edges of the raster are squared. Tighten the clamp.
4. Center the raster and eliminate shaded corners. Rotate the centering rings until the best effect is obtained.

VERTICAL HEIGHT

1. Set the Height control (R314) to mid-position.
2. Adjust the Vertical Linearity control (R321) to obtain the best linearity.
3. Adjust the Height control to obtain proper picture height.

HORIZONTAL FREQUENCY

1. Tune in an active channel.
2. Turn Horizontal Hold control (T401) to sync picture.
3. Make sure that picture goes out of sync when the selector is switched to another channel momentarily, back to original channel.

TUNER

If the range of Fine tuning control is not adequate to tune in a clear picture on one or more channels, oscillator cores must be adjusted.

1. Set the flatly cutted face of fine tuning shaft in a quarter angle with the face of terminal of tuner.
2. Adjust oscillator core with non-metallic aligner to obtain best picture, starting from higher channel down to lower. Do not press the core too hard during adjustment.

2 TELEVISION ALIGNMENT PROCEDURE

PRELIMINARY

Alignment is an exacting procedure and should be undertaken only when necessary. The following equipment is required for alignment work.

1. RF sweep generator, with a frequency range covering VHF all channels with a sweep width of at least 10MHz and having an adjustable output of at least 0.1 volt.
2. RF Marker, with an output of at least 0.1 volt having frequency range to cover VHF channel.
3. PIF Marker, with an output of at least 0.1 volt having frequency range to cover 40.4 MHz, 38.9 MHz, 37.9 MHz, 36.9 MHz, 35.9 MHz, 34.9 MHz, 33.4 MHz, 31.9 MHz.
4. Vacuum Tube Voltmeter (VTVM).
5. Cathode Ray Oscilloscope, preferable with a wide frequency range vertical amplifier and voltage calibrator.

2.1 PICTURE IF TRANSFORMER AND TRAP ALIGNMENT

1. Test Equipment Connection (See Fig. 1)

- Bias Supply Remove white lead wire jumper connected to the bottom view of the PRINTED CIRCUIT BOARD PW711.
 Supply the external AGC voltage (approx 2.5 volt) to the terminal TP102.
- RF Sweep Generator..... Connect to the VHF antenna terminal (P102)
- RF Marker Couple loosely to sweep generator output lead to provide markers.
- PIF Marker Couple loosely to Tuner output lead to provide markers.
- Oscilloscope Connect to video detector output, at the TP101 in series with 10K—30Kohm resistor.

Turn Channel selector to non active channel and set Fine tuning to suitable position.

2. Alignment

Step	Signal Generator	Adjust	Remark
1 Adjust 31.9 MHz Trap	31.9 MHz	L103	Adjust for minimum output of 31.9 MHz
2 Adjust 33.4 MHz Trap	33.6 MHz	L101	Adjust for minimum output of 33.6 MHz
3 Adjust 40.4 MHz Trap	40.4 MHz	L102	Adjust for minimum output at 40.4 MHz
4 Adjust Picture IF Band Pass Response (See Fig. 2)	37 MHz	PIFIA T101, T103	Adjust for the response curve show in Fig. 2
During the alignment adjust the output of sweep generator, the waveform on oscilloscope does not exceed 1Vss.			

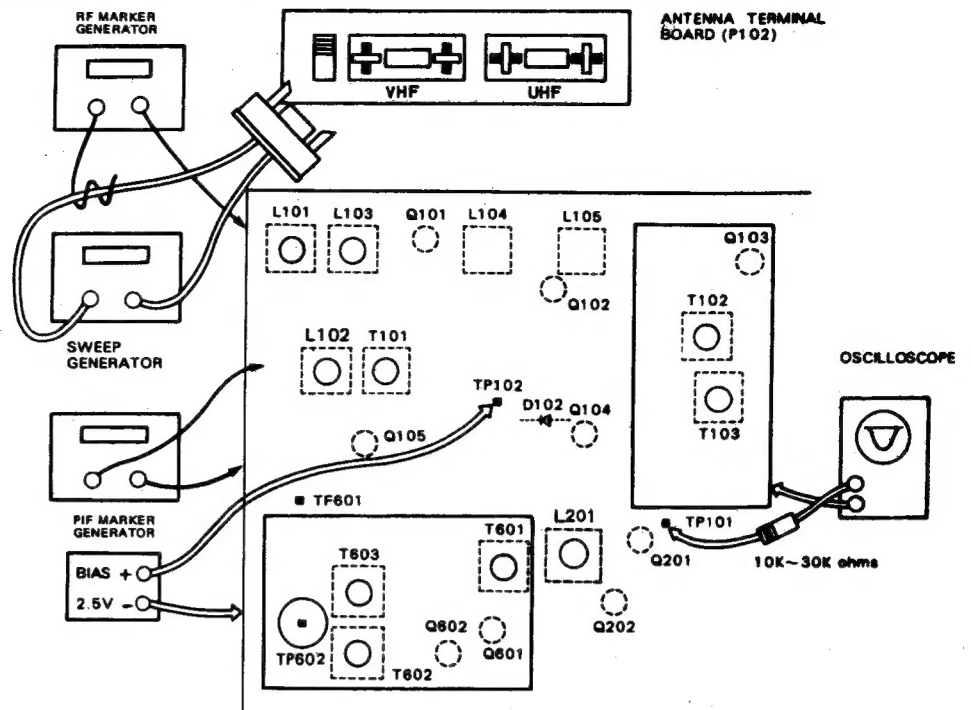
2.2 VIDEO ALIGNMENT AND SOUND ALIGNMENT

1. Test Equipment Connections: (See Fig. 3)

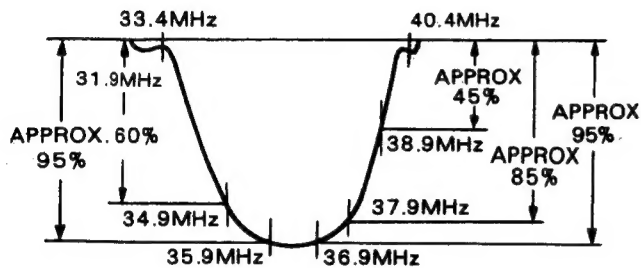
- Bias Supply Supply the external AGC voltage (Approx. 4. volts) to the terminal TP102.
- Signal Generator Connect to TP101 in series with 10 μ fd capacitor and 3.3 Kohm resistor.

2. Alignment

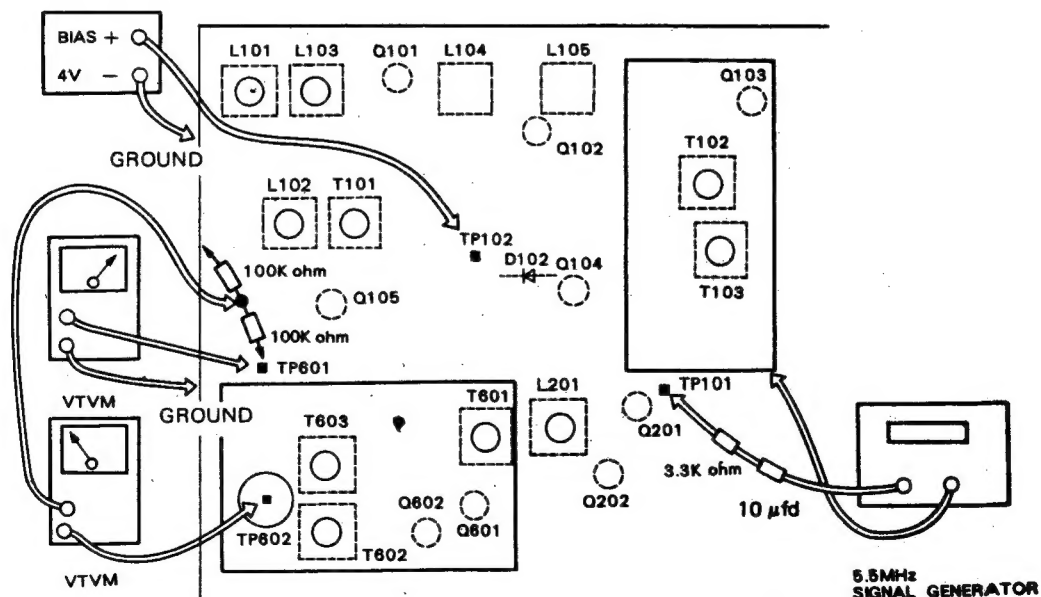
Step	Signal Generator	Adjust	Remarks
Connect VTVM to CRT Cathode Pin 2 and chassis ground.			
Adjust 5.5 MHz Trap Coil	5.5 MHz	L201	Remove one end of C311 and C417 on the PRINTED CIRCUIT BOARD PW711. Adjust the contrast control (R215) to maximum set generator output approx. 100mV. Adjust L201 for minimum output indication on the VTVM connected to CRT pin 2.
Connect VTVM between TP601 and chassis. (See Fig. 3)			
Adjust SIF 1 SIF 2	5.5 MHz 3mV	SIF 1 SIF 2	Turn SIF1, SIF 2A SIF 2B for maximum output indication on the VTVM.
Connect between TP601 and chassis in series with two 100K Ω resistor, and connect VTVM between its center and TP602. (See Fig 3)			
Adjust SIF 2B	5.5 MHz 30mV	SIF 2B	Adjust SIF 2B for 0 volt indication on the VTVM.



(Fig. 1)
PICTURE IF ALIGNMENT

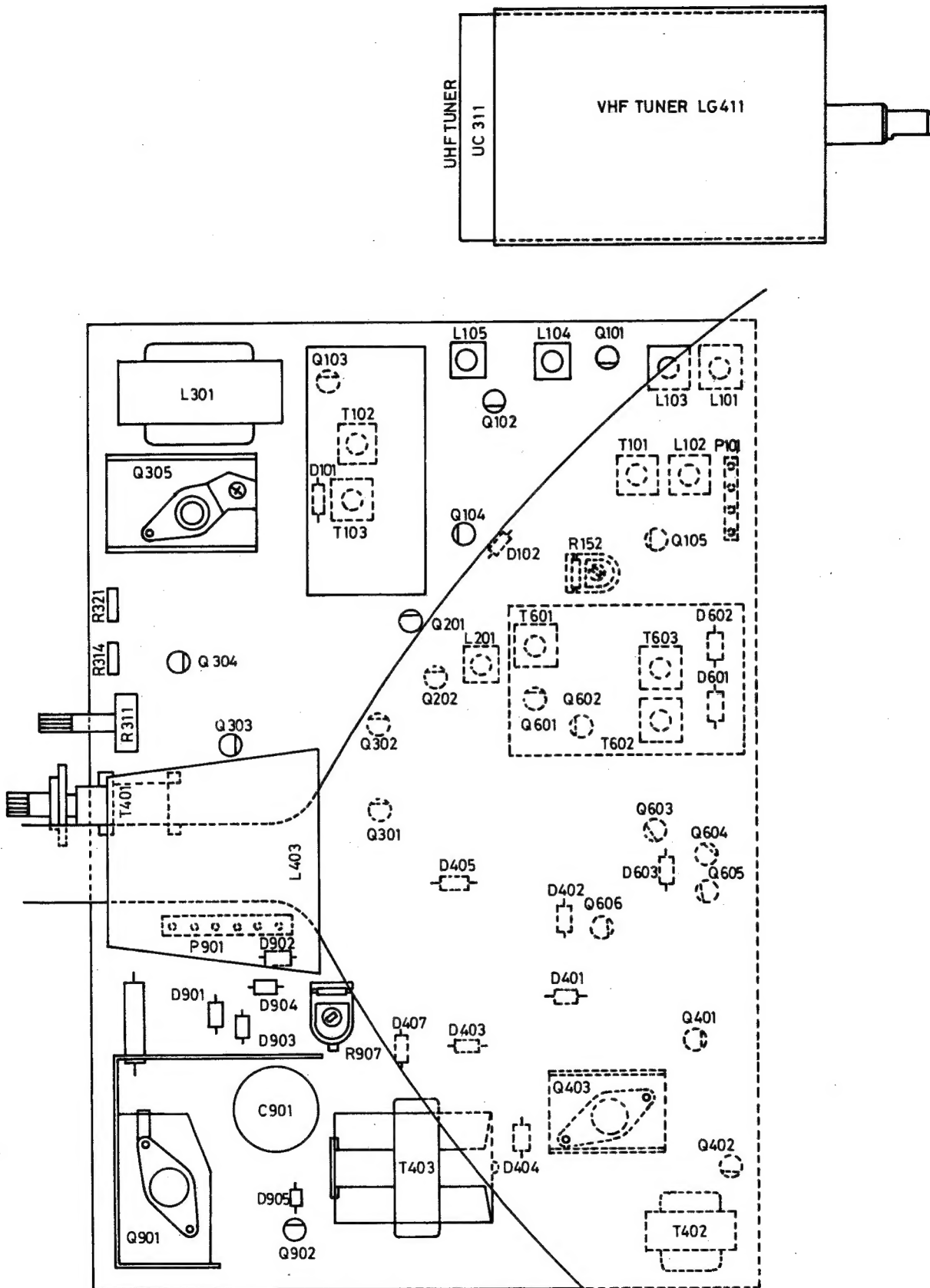


(Fig. 2)
PIF RESPONSE CURVE

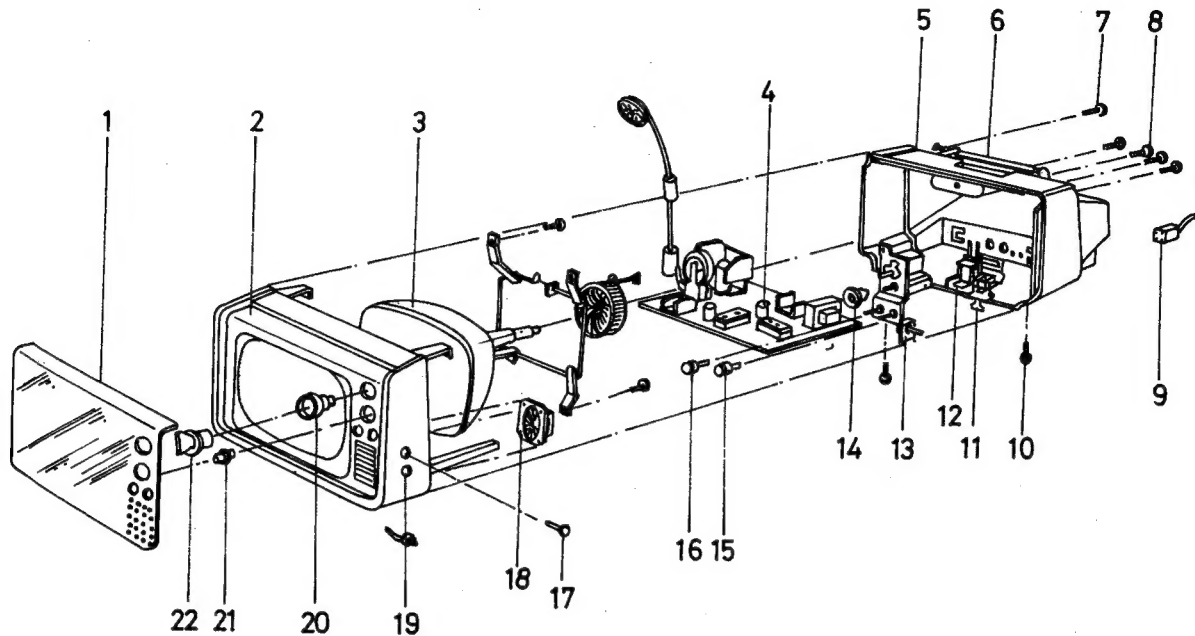


(Fig. 3)
VIDEO AND SOUND ALIGNMENT

3. MAIN PARTS LOCATION (CHASSIS TOP VIEW)



4. CABINET CONSTRUCTION AND PARTS LIST



Key No.	Part No.	Description	Key No.	Part No.	Description
1	23827086	Black Screen (12SE)	10	23030036	Tapping Screw 4 x 16mm, (2 used), Rear Cover Mounting
	23827094	Black Screen (12SS)	11	23876086A	Bracket, Power Transformer & Fuse Holder Mounting
2	23813833	Cabinet Front (12SE, 12SS ... Red)		23035410	Tapping Screw, 4 x 10mm, (4 used), Bracket Mounting
	23813798	Cabinet Front (12SE, 12SS ... White)		23035308	Tapping Screw, 3 x 8mm, (3 used), Fuse Holder Mounting
	23875868	Retainer, Rear Cover Mounting, (2 used)		23035408	Tapping Screw, 4 x 8mm, Power Transformer Mounting
	23875869	Retainer, Rear Cover Mounting	12	23876087	Bracket, Connector (for Power Supply) Mounting
	23035310	Tapping Screw, 3 x 10mm, (6 used)		23035410	Tapping Screw, 4 x 10mm, (2 used), Bracket Mounting
	23864046B	Frame(A), Chassis Assembly Holding		23035308	Tapping Screw, 3 x 8mm, (2 used), Connector Mounting
	23864047B	Frame(B), Chassis Assembly Holding		23845116	Wire Clamp
	23035312	Tapping Screw, 3 x 12mm, (4 used), Frame Mounting	13	23842190	Bracket, Tuner & Controls Mounting
3	23876076B	Retainer, Antenna Terminal Board Mounting		23035410	Tapping Screw, 4 x 10mm, (3 used)
	23035408	Tapping Screw, 4 x 8mm		23712305	Screw, 3 x 5mm, (3 used)
	23112042	Picture Tube, Type 310DMB4		23875850B	Bracket, Tuner (UHF) Mounting
	23865793	Retainer, Picture Tube Mounting, (4 used)		23035308	Tapping Screw, 3 x 8mm, (3 used)
	23184099A	Earth Plate (2 used)		23712305	Screw, 3 x 5mm, (3 used)
	23858237	Rubber Cushion, for Picture Tube, (4 used)		23184098	Earth Plate
	23094400	Terminal		23035408	Tapping Screw, 4 x 8mm, Earth Plate Mounting
	23035410	Tapping Screw, 4 x 10mm, (8 used)	14	23833220	UHF Dial
	23841082	Harness, Picture Tube Mounting	15	23826109	Knob, Pull-On Volume
	23712450	Screw, 4 x 50mm, for Harness	16	23826107	Knob, Contrast
	23742040	Nut, 4mm, for Harness	17	23826147	Knob, Brightness (12SE, 12SS ... Red)
4	23141752	Printed Circuit Board with components, PW711		23826155	Knob, Brightness (12SE, 12SS ... White)
5	23812974	Rear Cover (12SE ... Red)	18	23151107	Speaker, 4 x 2-1/2 inch, 32 ohm
	23812975	Rear Cover (12SE ... White)		23162077	Terminal
	23819019	Rear Cover (12SS ... Red)		23035308	Tapping Screw, 3 x 8mm, (2 used)
	23819020	Rear Cover (12SS ... White)	19	23163061	Jack, Earphone
6	23124054	VHF Antenna	20	23826106	Knob, VHF Fine Tuning
	23162077	Terminal	21	23826163	Knob, UHF Channel Selector
	23035410	Tapping Screw, 4 x 10mm, VHF Antenna Mounting	22	23826255	Knob, VHF Channel Selector
7	23035005	Tapping Screw, 4 x 12mm, (3 used), Rear Cover Mounting			
8	23773310	Screw, 3 x 10mm, (2 used), Retainer (Antenna Terminal Board) Fixing			
9	23176192	Power Supply Cord (12SE)			
	23176197	Power Supply Cord (12SS)			

5. CHASSIS REPAIR PARTS LIST

Schematic Location	Parts Number	Description
TRANSISTOR AND DIODES		
Q1		2SC606 VHF RF & UHF IF AMP.
Q2		2SC605 MIX & UHF IF AMP.
Q3		2SC287 VHF OSC.
Q4	23114191	2SC787 UHF RF AMP.
Q5		2SC684 UHF OSC.
D1		1S750 UHF MIX.
Q101 }	23114031	2SC382-BN { 1st PIF AMP.
Q102 }	23114157	2SC382-R { 2nd PIF AMP.
Q103	23114078	2SC388A 3rd PIF AMP.
Q104	23114136	2SA495-O AGC Keyed AMP.
Q105	23114050	2SA495-R AGC AMP.
Q201	{ 23114126	2SC380A-O } VIDEO AMP.
	{ 23114127	2SC380A-R }
	{ 23114249	2SC983-R }
Q202	{ 23114250	2SC983-O } VIDEO OUTPUT
	{ 23114251	2SC983-Y }
Q301 }		SYNC. SEP
Q302 }	23114124	2SA495-Y NOISE CANCEL
Q604 }		AUDIO DRIVE
Q303	23114119	2SC372-O VERT. OSC
Q304	23114118	2SC372-Y VERT. AMP.
Q305	23114084	2SC791 VERT. OUTPUT.
Q401	23114015	2SC735-O HORIZ. OSC
Q402 }	23114017	2SC735-Y { HORIZ. AMP.
Q605 }	23114015	2SC735-O { AUDIO OUTPUT
Q403	23114038	2SC508 HORIZ OUTPUT
Q601 }		
Q602 }	23114126	2SC380A-O SIF AMP.
Q603	23114119	2SC372-O
	23114118	2SC372-Y } AUDIO AMP.
	23114137	2SA-562-R
Q606	23114081	2SA562-O AUDIO OUTPUT
	23114220	2SD130-Y
Q901	23114221	2SD130-BL POWER FILTER
Q902	23114017	2SC735-Y POWER FILTER
D101 }		PIF Detector
D401 }		Phase Detector
D402 }	23115088	IN60 Phase Detector
D601 }		Sound Detector
D602 }		Sound Detector
D102	23115051	1S1555 AGC Clipper
D403	23115131	FG-2N Damper
D404	23115130	FG-2Na Boost
	23115245	1S2329
D405	23115145	BB-4 100V Rectifier
D406	23115157	US15/1 High Voltage Rectifier
	23115246	1S2310
D407	23115135	BB-6 300V Rectifier
D603	23115249	S3016R Temp. Comp.
D901 }		
D902 }	23115263	1S1885
D903 }	23115140	10D2 Low Volt Rectifier
D904 }		
D905	23115076	1S1717 Standard Voltage

Schematic Location	Parts Number	Description
TRANSFORMERS AND COILS		
T101	23262211	AZ-9211E PIF Input Trans.
T102	23262213	AZ-9211G 3rd PIF Trans.
T103	23262214	AZ-9211H 3rd PIF Trans.
T401	23225135	AZ-9209 Horizontal OSC Trans.
T402	23224009	TLN-516 Horizontal Driver Trans.
T403	23226247	AZ-9191D Horizontal Output Trans.
T601	23254021	AZ-9148G 1st SIF Trans.
T602	23256028	AZ-9149 2nd SIF Trans.
T603	23256036	AZ-9150C 2nd SIF Trans.
L101	23262210	AZ-9151G 33.4 MHz Trap coil
L102 }	23262169	AZ-9151D { 40.4MHz Trap Coil
L103 }		
L104 }	23262212	AZ-9211F { 1st PIF coil
L105 }		
L106	23252107	15 μ H RF Choke coil
L107	23261047	AZ-9246A RF Choke coil
L108	23103034	Bead core
L201	23252062	AZ-9147C 5.5MHz Trap coil
L203	23252432	560 μ H Peaking coil
L301	23221021	TFD-341A Vert output coil
L401	23271001	27 μ H \pm 10% Choke coil
L403	23227091	TSB303F Deflection Yoke
T901	23213229	TPW-994F Power Transformer

CAPACITORS

(All Capacitors 50V, $\pm 10\%$ Unless Otherwise Noted)

All Capacitors 50V		
C101	24436390	Ceramic 39Pfd $\pm 5\%$ SL
C102	24436270	Ceramic 27Pfd $\pm 5\%$ SL
C103	24357180	Ceramic 18Pfd $\pm 5\%$ RH
C104	24094247	Ceramic 5Pfd ± 0.25 Pfd RH
C105, C106	24357080	Ceramic 8pfd ± 0.25 pfd RH
C107, C147		
C902, C904	24232472	Ceramic 0.0047 μ fd
C905, C908		
C108	24436150	Ceramic 15Pfd $\pm 5\%$ SL
C109, C110		
C112, C113		
C116, C122		
C123, C148	24232103	Ceramic 0.01mfd
C602, C603		
C605, C607		
C616, C143		
C111, C115	24436150	Ceramic 15Pfd $\pm 5\%$ SL
C114	24356180	Ceramic 18Pfd $\pm 5\%$ SL
C117	24436030	Ceramic 3Pfd ± 0.25 Pfd SL
C118	24232223	Ceramic 0.022 μ fd
C119	24094131	Ceramic 22Pfd $\pm 5\%$ PH
C120	24356030	Ceramic 3Pfd ± 0.25 Pfd PH
C121	24094230	Ceramic 5Pfd ± 0.25 Pfd PH
C124	24436100	Ceramic 10Pfd $\pm 5\%$ SL
C125	24072004	Electrolytic 220 μ fd 16V
C126	24436270	Ceramic 27Pfd $\pm 5\%$ SL
C127	24436050	Ceramic 5Pfd ± 0.25 Pfd SL
C142, C146	24633220	Electrolytic 22 μ fd 10V

CHASSIS REPAIR PARTS LIST (Cont'd)

Schematic Location	Parts Number	Description	Schematic Location	Parts Number	Description
C144, C306			R105, R208	24945331	Carbon composition 330ohm 1/4W
C403, C404	24602223	Plastic film 0.022 μ fd	R106	24928222	Insulated carbon film 2.2Kohm
C407, C307			R107, R112	24945682	Carbon composition 6.8Kohm 1/4W
C145	24063002	Electrolytic 22 μ fd 16V	R108	24928681	Insulated Carbon film 680ohm
C149, C903	24072008	Electrolytic 22 μ fd 16V	R110, R601	24928472	Insulated carbon film 4.7Kohm
C201	24359181	Ceramic 180Pfd $\pm 5\%$ TH	R111	24928272	Insulated carbon film 2.7Kohm
C204	24072019	Electrolytic 100 μ fd 6.3V	R113	24928331	Insulated carbon film 330ohm
C205	24214102	Ceramic 1000Pfd $\pm 10\%$	R114	24945822	Carbon composition 8.2Kohm 1/4W
C206	24838104	Plastic film 0.1 μ fd	R115	24927681	Insulated carbon film 680ohm $\pm 5\%$
C207	24602152	Plastic film 0.0015 μ fd $\pm 10\%$	R116	24927560	Insulated carbon film 56ohm $\pm 5\%$
C208	24625229	Electrolytic 2.2 μ fd 315V	R117	24941122	Carbon composition 1.2Kohm $\pm 5\%$ 1/4W
C210	24229103	Ceramic 0.01 μ F	R118, R303	24928392	Insulated carbon film 3.9Kohm
C301	24212561	Ceramic 560Pfd $\pm 10\%$	R119	24945100	Carbon composition 10ohm 1/4W
C302, C303	24072060	Electrolytic 0.47 μ fd	R120	24928183	Insulated carbon film 18Kohm 1/8W
C304	24602153	Plastic film 0.015 μ fd $\pm 10\%$	R141	24917102	Insulated carbon film 1Kohm $\pm 5\%$
C305	24602472	Plastic film 0.0047 μ fd $\pm 10\%$	R142	24927331	Insulated carbon film 330ohm $\pm 5\%$
C308, C312	24088035	Electrolytic 2.2 μ fd $\pm 10\%$	R143	24927102	Insulated carbon film 1Kohm $\pm 5\%$
C309	24833393	Plastic film 0.039 μ fd $\pm 10\%$	R145	24927272	Insulated carbon film 2.7Kohm $\pm 5\%$
C310	24072003	Electrolytic 330 μ fd 16V	R146	24945101	Carbon composition 100ohm 1/4W
C311, C405	24602104	Plastic film 0.1 μ fd $\pm 10\%$	R147	24927682	Insulated carbon film 6.8Kohm $\pm 5\%$
C401	24602332	Plastic film 0.0033 μ fd $\pm 10\%$	R148	24927473	Insulated carbon film 47Kohm $\pm 5\%$ 1/8W
C402	24602272	Plastic film 0.0027 μ fd $\pm 10\%$	R150	24945681	Carbon composition 680ohm 1/4W
C406	24636339	Electrolytic 3.3 μ fd 50V	R152	24061047	Control AGC 500ohm 0.1W
C408	24692683	Plastic film 0.068 μ fd $\pm 5\%$	R153	24945102	Carbon composition 1Kohm 1/4W
C409	24692563	Plastic film 0.056 μ fd $\pm 10\%$	R154	24927183	Insulated carbon film 18Kohm $\pm 5\%$
C411	24214391	Ceramic 390Pfd $\pm 10\%$	R155	24927392	Insulated carbon film 3.9Kohm $\pm 5\%$
C412	24085024	Electrolytic 3.3 μ fd 25V	R203	24945471	Carbon composition 470ohm 1/4W
C413	24095212	Plastic film 0.039 μ fd	R206	24928680	Insulated carbon film 68ohm
C414	24072004	Electrolytic 220 μ fd 16V	R207, R320		
C415	24072002	Electrolytic 470 μ fd 16V	R410, R606	24945561	Carbon composition 560ohm 1/4W
C416	24072079	Electrolytic 1 μ fd 160V	R209	24972822	Oxide metal film 8.2Kohm 1/2W
C417	24602473	Plastic film 0.047 μ fd $\pm 10\%$	R210	24945184	Carbon composition 180Kohm 1/2W
C418	24214471	Ceramic 470Pfd 500V	R212	24946334	Carbon composition 330Kohm 1/4W
C419	24834823	Plastic film 0.082 μ fd 400V	R213	24058064	Brightness control 100Kohm 1/2W
C601	24094186	Ceramic 100Pfd $\pm 5\%$ SH	R214	24945153	Carbon composition 15Kohm 1/4W
C604	24359390	Ceramic 39Pfd $\pm 5\%$ TH	R215	24058156	Contrast control 1Kohm 1/2W
C606	24094184	Ceramic 82Pfd $\pm 5\%$ SH	R216	24946102	Carbon composition 1 Kohm 1/2W
C608	24232272	Ceramic 2700Pfd	R301	24928182	Insulated carbon film 1.8Kohm
C609, C610	24633100	Electrolytic 10 μ fd 16V	R302	24928124	Insulated carbon film 120Kohm
C611, C907	24072006	Electrolytic 47 μ fd 16V	R304	24945394	Carbon composition 390Kohm 1/4W
C612	24072026	Electrolytic 47 μ fd 10V	R305, R310	24918393	Insulated carbon film 39Kohm
C613	24072003	Electrolytic 330 μ fd 16V	R307	24928682	Insulated carbon film 6.8Kohm
C614	24072027	Electrolytic 100 μ fd 10V	R308	24928103	Insulated carbon film 10Kohm
C615	24602182	Plastic film 1800Pfd $\pm 10\%$	R309	24945155	Carbon composition 1.5Mohm 1/4W
C617, C910	24232104	Ceramic 0.1 μ fd	R311	24061117	Vertical Hold control 100Kohm 0.2W
C618	24432588	Ceramic 68Pfd $\pm 10\%$	R312	24928154	Insulated carbon film 150Kohm
C901	24086004	Electrolytic 3000 μ fd 25V	R313	24945273	Carbon composition 27Kohm 1/4W
C906, C909	23194472	Paper 0.0047 μ fd $\pm 10\%$ (12SE)	R314	24061115	Height control 33Kohm 0.1W
C906, C909		(12SS)	R315	24941823	Carbon composition 75Kohm 1/4W
			R316, R328	24918153	Insulated carbon film 15Kohm
			R317	24918101	Insulated carbon film 100ohm
			R318	24972123	Oxide metal film 12Kohm 1/2W
			R319	24928181	Insulated carbon film 180ohm
			R321	24061052	Vertical Linearity control 5Kohm 0.1W
			R322	24972392	Oxide metal film 3.9Kohm 1/2W
			R323	24000023	Thermistor D33A

RESISTORS

(All Resistors 1/8W, $\pm 10\%$, unless otherwise noted)

R101	24941120	Carbon composition 12ohm $\pm 5\%$ 1/4W
R102	24918331	Insulated carbon film 330 ohm
R103	24945181	Carbon composition 180ohm 1/4W
R104	24945821	Carbon composition 820ohm 1/4W

Schematic Location	Parts Number	Description
R324	24945152	Carbon composition 1.5Kohm 1/4W
R326, R626	24021229	Wire wound 2.2ohm $\pm 5\%$ 1/2W
R327	24946182	Carbon composition 1.8Kohm 1/2W
R329	24918221	Insulated carbon film 220ohm
R401	24928821	Insulated carbon film 820ohm
R402, R610	24945223	Carbon composition 22Kohm 1/4W
R404	24972682	Oxide metal film 6.8Kohm 1/2W
R405	24928822	Insulated carbon film 8.2Kohm
R406	24945681	Carbon composition 680ohm 1/4W
R407	24918182	Insulated carbon film 1.8Kohm
R403, R408 } R417	24945393	Carbon composition 39Kohm 1/4W
R409	24917270	Insulated carbon film 27ohm $\pm 5\%$
R411	24941151	Carbon composition 150ohm $\pm 5\%$
R412	24945560	Carbon composition 56ohm 1/4W
R413	24972150	Oxide carbon film 15ohm 1/2W
R414	24972221	Oxide carbon film 220ohm 1/2W
R415	24918123	Insulated carbon film 12Kohm
R416	24945151	Insulated carbon film 150ohm 1/4W
R418	24946474	Carbon composition 470Kohm 1/2W
R602, R604	24945561	Carbon composition 560ohm 1/4W
R603	24928222	Insulated carbon film 2.2Kohm
R605, R607	24945103	Carbon composition 10Kohm 1/4W
R608, R609	24928331	Insulated carbon film 330ohm
R616	24927150	Insulated carbon film 15ohm $\pm 5\%$
R617	24927683	Insulated carbon film 68Kohm $\pm 5\%$
R618	24927104	Insulated carbon film 100Kohm $\pm 5\%$
R619	24928332	Insulated carbon film 3.3Kohm
R620	24945270	Carbon composition 27ohm 1/4W
R621	24918332	Insulated carbon film 3.3Kohm
R623	24945180	Carbon composition 18ohm 1/4W
R624	24917910	Insulated carbon film 91ohm $\pm 5\%$
R625	24941681	Carbon composition 680ohm $\pm 5\%$ 1/4W
R630	24055044	Control pull on volume 15Kohm
R631	24946220	Carbon composition 22ohm 1/2W
R801	24945565	Carbon composition 5.6Mohm 1/4W
R802	24945103	Carbon composition 10Kohm 1/4W
R901	24524150	Cement 15ohm 5W
R903	24972181	Oxide metal film 180ohm 1/2W
R904	24973331	Oxide metal film 330ohm 1/2W
R905	24928470	Insulated carbon film 47ohm
R906	24918391	Carbon composition 390ohm
R907	24061047	12V adjust control 500ohm 0.1W
R909	24945182	Carbon composition 1.8Mohm 1/4W

COMPLEX PARTS

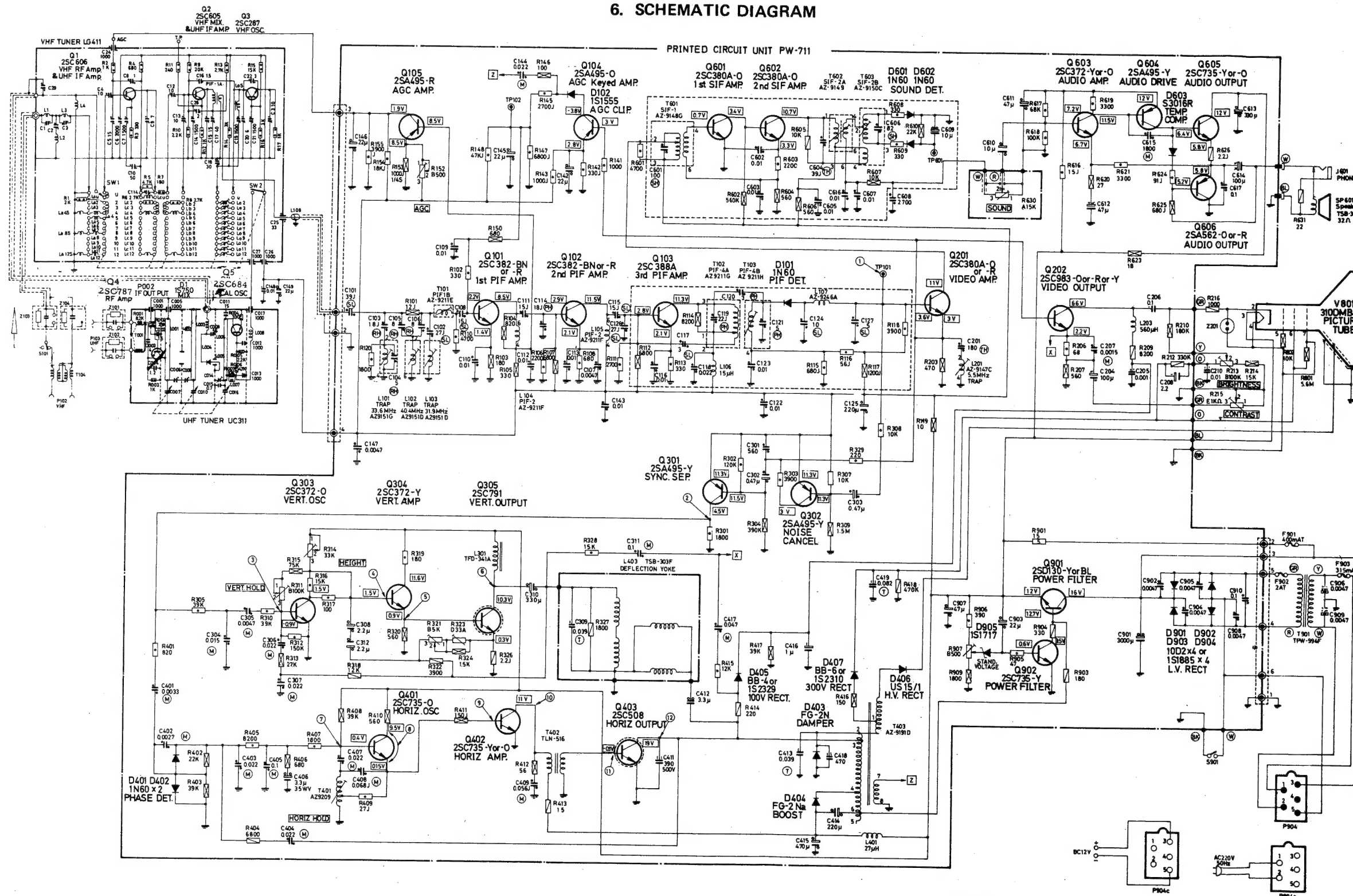
Z101, Z102 } Z103, Z104 }	23134031	C/R Network
Z201	23140013	Discharge gap

MISCELLANEOUS

PW711	23141752	Printed circuit unit
LG411	23121275	VHF Tuner LG411
UC311	23121274	UHF Tuner UC311
D406a	23117308	Insulated gap
D406b	23117826	Insulated gap

Schematic Location	Parts Number	Description
V801a	23116120	Socket CRT
V801b	23117623	Cap & Lead CRT Anode
P101a	23164081	4P Plug
P901a	23164083	6P Plug
P101b	23116202	4P Socket
P901b	23116204	6P Socket
R311a	23851065	Insulated axis
Q305a	23875658	Heat radiator of 2SC791
Q403a	23875241	Heat radiator of 2SC508
Q901a	23875660	Heat radiator of 2SD130
	23859250	Shield case
	23859251	Shield case
	23859252	Shield case
	23859177	Shield case
	23859176	Shield case
	23859175	Shield case
SP601	23151107	Speaker 32ohm 2.5 x 4inch TSB-366
J601	23163061	Jack Earphone
P904	23164065	Power supply plug
P104	23142135	Balun
P904a	23176192	AC power cord (12SE)
	23176197	AC power cord (12SS)
F901	23144141	Fuse 400m AT (12SE)
	23114091	Fuse 400m AT (12SS)
F902	23144120	Fuse 2.0 AT (12SE)
	23114129	Fuse 2.0 AT (12SS)
F903	23144117	Fuse 315m AT (12SE)
	23144052	Fuse 315m AT (12SS)
FS901	23165095	Fuse holder 1P
FS902	23165094	Fuse holder 2P
	23142229	Antenna circuit Board
	23164117	Antenna Plug (UHF)
	23124054	Antenna VHF
	23124019	Antenna UHF
P904C	23176064	DC cord

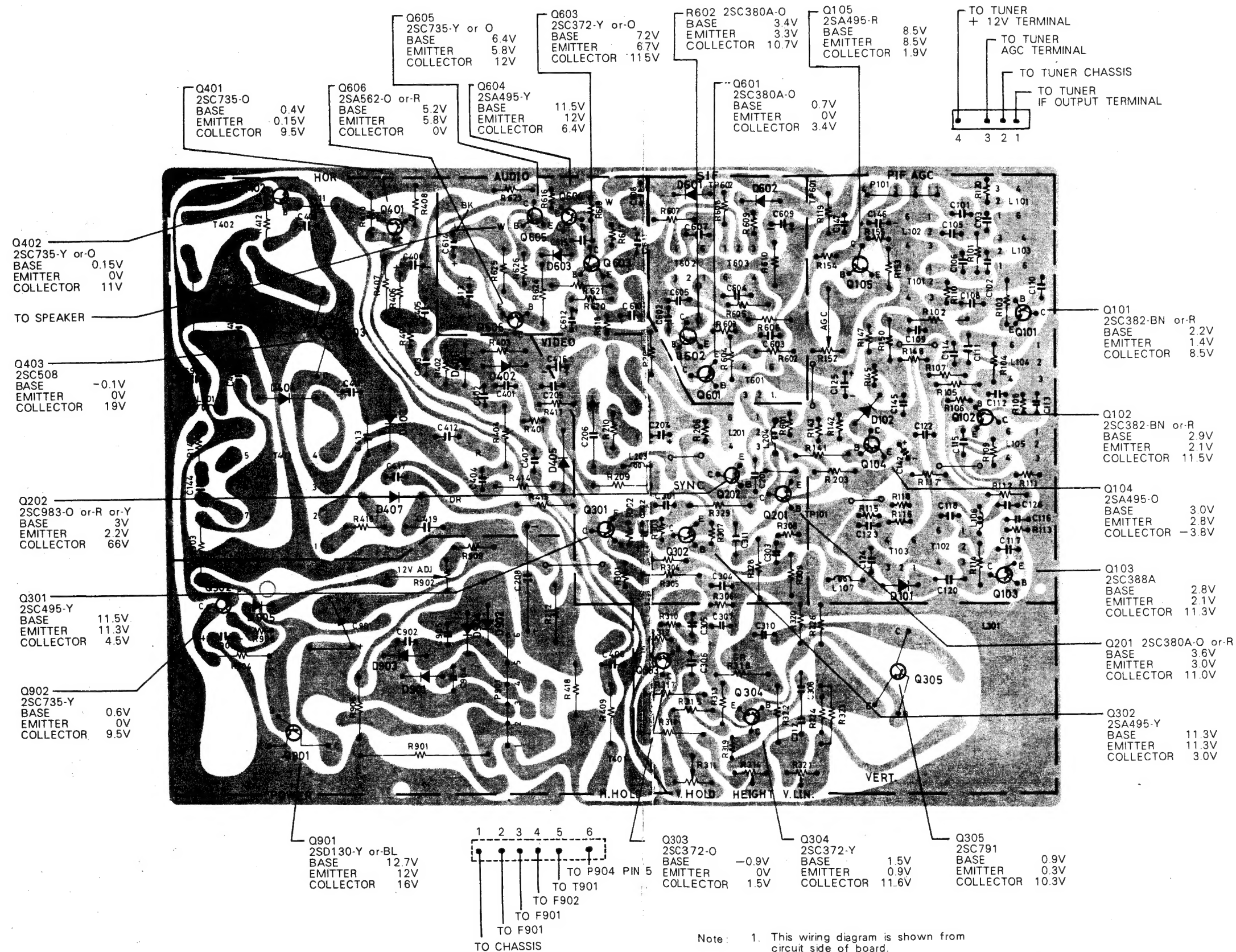
6. SCHEMATIC DIAGRAM



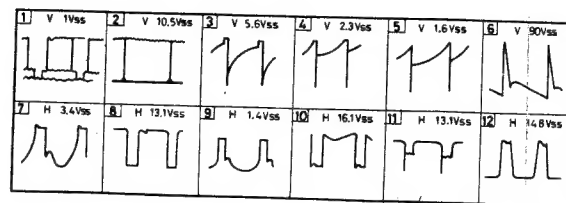
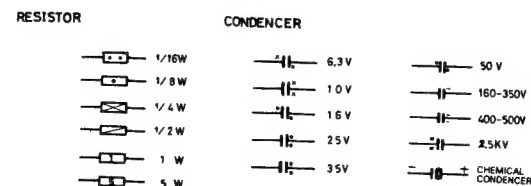
NOTES:

1. All resistance values are in ohm K=1,000, M=1,000,000.
2. Unless otherwise noted in schematic diagram, all capacitors values less than 1 are expressed in μ fd and the more than 1 are in pfd.
3. Voltage readings are taken with "VTVM" from point indicated to chassis ground, tuner unused channel, contrast at maximum, other controls at normal, line voltage 220 volts. Voltage readings may vary $\pm 20\%$.
4. All wave forms are measured with strong signal input, contrast set to give normal picture.
5. This schematic diagram covers basic or representative chassis only. There may be some component or partial schematic difference between actual chassis and the schematic diagram.

7 PRINTED CIRCUITS BOARD PW711



12SE
SCHEMATIC DIAGRAM



1. All resistance values are in ohm $K=1,000$, $M=1,000,000$.
2. Unless otherwise noted in schematic diagram, all capacitors values less than 1 are expressed in μfd and the more than 1 are in pfd .
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Voltage readings may vary $\pm 20\%$.
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5. This schematic diagram covers basic or representative chassis only.
There may be some component or partial schematic difference between actual chassis and the schematic diagram.